STRATEGIES FOR THE PROTECTION OF SENSITIVE STREAMS: TEN MILE CREEK

Montgomery County, Maryland

EXECUTIVE SUMMARY

Introduction

Ten Mile Creek is a tributary to Seneca Creek and drains a portion of the Clarksburg Special Protection Area (SPA) in Montgomery County, Maryland. Ten Mile Creek is designated Use I-P waters by the State of Maryland and drains to Lake Seneca, a public drinking water supply. Ten Mile Creek is also designated a "sensitive stream" by Montgomery County.

The purpose of this report is to present strategies to be applied to future development in the Clarksburg SPA with a focus on planned future development within the Ten Mile Creek watershed.

Conclusions

In summary, the following measures are recommended for implementation in the Ten Mile Creek watershed:

- Preserve or establish effective forested riparian buffers.
- The application of "volume control" stormwater management practices that don't simply filter runoff and reduce peak discharges, but also reduce the volume of runoff through infiltration and/or evapo-transpiration (ET).
- Closely related to the above, the application of SWM BMPs, including structural and non-structural measures, that encourage infiltration and thereby maintain critically important baseflow in streams during dry weather.
- The design, installation and maintenance of effective erosion and sediment control (ESC) practices during construction.
- The avoidance of stream crossings and other encroachments in the riparian buffer and the implementation of design and stabilization measures that facilitate fish passage and mitigate thermal impacts where these encroachments are unavoidable.

As experience in the Red Run watershed has clearly demonstrated, the implementation of these techniques has a proven track record of protecting sensitive streams such as Ten Mile Creek.

The imposition of impervious caps is not recommended. Such approaches attempt to apply a simplistic solution to what is clearly a complex problem. Studies that have attempted to correlate stream health with watershed imperviousness show mixed results and it is therefore apparent that factors other than watershed imperviousness are affecting the rankings. These factors include riparian buffers, SWM and other measures, and yet remarkably, the studies fail to consider these important features. No impervious caps were imposed by Baltimore County in the Red Run watershed and yet this sensitive stream remains healthy. And many of the measures that were employed along Red Run are now out of date and far less stringent than those that will be employed along Ten Mile Creek.

Ernest I. Sheppe, III, P.E.

January 20, 2010

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The purpose of this report is to present strategies to be applied to future development in the Clarksburg SPA with a focus on planned future development within the Ten Mile Creek watershed.

Summary of Recommendations

Based on a review of the Ten Mile Creek watershed, a review of the scientific literature, and experience on similar sensitive streams, the following measures are recommended for implementation:

- Preserve or establish effective forested riparian buffers.
- The application of "volume control" stormwater management practices that don't simply filter runoff and reduce peak discharges, but also reduce the volume of runoff through infiltration and/or evapo-transpiration (ET).
- Closely related to the above, the application of BMPs, including structural and non-structural SWM measures, that encourage infiltration and thereby maintain critically important baseflow in streams during dry weather.
- The design, installation and maintenance of effective erosion and sediment control (ESC) practices during construction.
- The avoidance of stream crossings and other encroachments in the riparian buffer and the implementation of design and stabilization measures that facilitate fish passage and mitigate thermal impacts where these encroachments are unavoidable.

Each of these recommendations is discussed in greater detail in the following section of this report.

Discussion

Forested Riparian Buffers

Although vegetated, non-forested riparian buffers can serve as "filter strips" and effectively remove pollutants in stormwater runoff, this discussion focuses on forested buffers. Forested riparian buffers serve a number of important roles in preserving and protecting sensitive streams and their habitat. These valuable functions include:

- The shade provided by forested buffers results in cooler stream temperatures, which in turn results in higher dissolved oxygen (DO) levels and the preservation of sensitive cold water species, such as trout, and the aquatic insects (prey species) that these finfish need to survive.
- The input of organic matter from adjacent forested areas into the stream provides the fundamental energy needed by aquatic life, particularly the aquatic insects that form the foundation of the food chain.
- Forested stream banks result in wider stream channels, and therefore, more aquatic habitat per stream mile than non-forested streams.
- Wider, healthier stream channels provide greater nutrient processing than narrower, non-forested channels.
- Like any vegetated buffer of adequate width, forested riparian buffers can effectively filter pollutants in stormwater runoff and thus act to provide a "final polish" as well as a "last line of defense," both during construction (ESC) and post construction (SWM).
- Preservation primary and secondary recharge areas that are critical to maintaining stream baseflows during extended periods of dry weather.

The benefits of riparian buffers are well documented in the literature and a lengthy discussion of these well recognized benefits is beyond the scope of this short paper. However, the graphs and tables provided below illustrate the importance that **buffer width** plays in filtering common pollutants associated with stormwater runoff. The following charts and tables where prepared by Environmental and Turf Services, Inc. (Baris, et al., 2007).

Table 1: Critical Buffer Widths for Each of the Three Parameters (Figures 1-3)

Parameter	Critical Buffer Width (range)
TP	50-60 ft
TN	55-65 ft
TSS	40-50 ft

The term "critical buffer width" as used in the table above is essentially a point of diminishing returns beyond which further increases in buffer width results in limited (or perhaps zero) improvement in buffer removal efficiency – see Figures 1-3 below for a graphical presentation of this concept.

Figure 1: Total Phosphorus (TP) Removal Efficiency vs. Buffer Width (legend in Table 2)

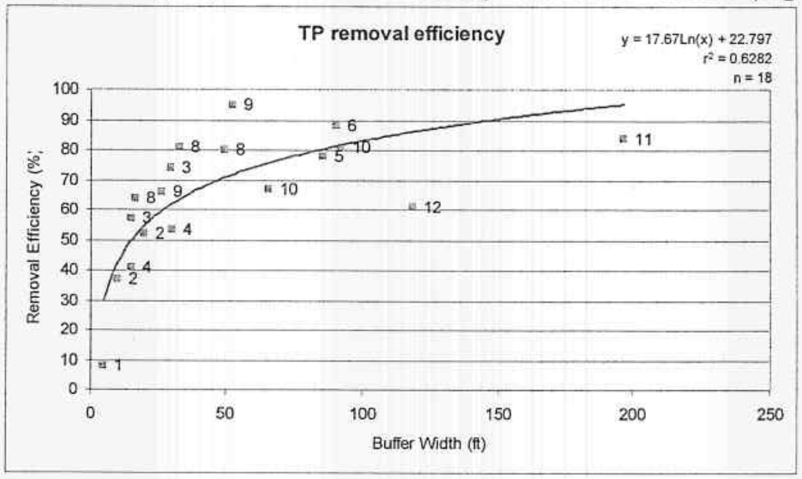

Figure 2: Total Nitrogen (TN) Removal Efficiency vs. Buffer Width (legend in Table 3)

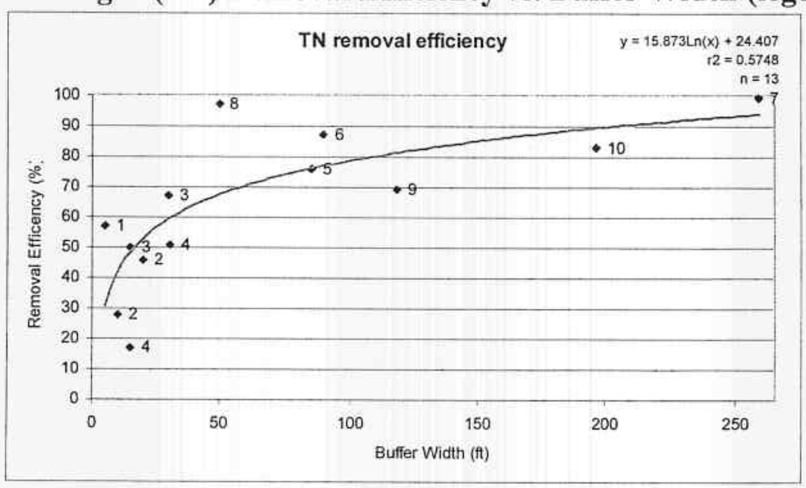

Figure 3: Total Suspended Solids (TSS) Removal Efficiency vs. Buffer Width (legend in Table 4)

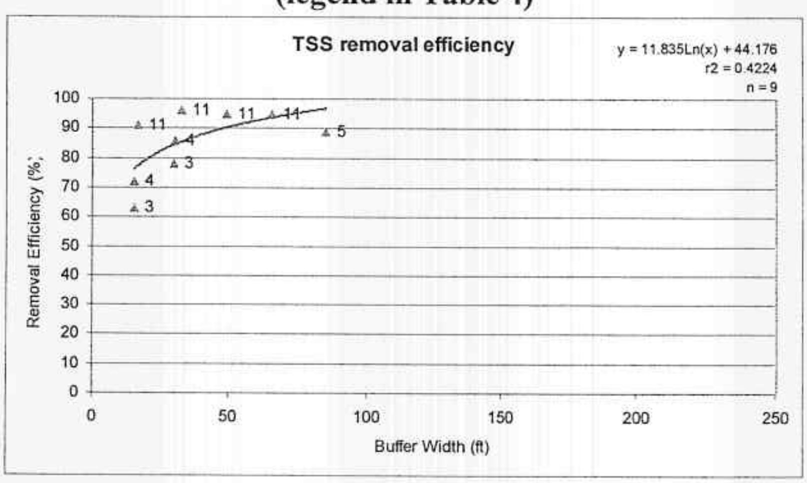

Table 2: Summary of TP Removal Efficiency Data, References, and Vegetative Type

data label in figure 1	buffer width (m)	removal efficiency	vegetative cover type	comments	reference
1	1.5	8	grass	gravely silt loam slopes = 10%	Doyle et al., 1977
2	3	37	grass	Coland soil, average slope = 3%	Lee et al., 2004
3	4.6	57	grass	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	4.6	41	grass/shrub	gravely, silt-loam soils, slopes = 35-40%	Magette et al., 1987
8	5	64	grass	silt loam (38, 54, 8 – % sand, silt, clay) slope = 2.3%	Abu-Zreig et al., 2003
2	6	52	grass	Coland soil, average slope = 3%	Lee et al., 2004
9	8	66	--	--	Vought et al., 1994
3	9.1	74	grass/rye mix	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	9.2	53	grass/shrub	gravely, silt-loam soils, slopes = 35-40%	Magette et al., 1987
8	10	81	grass	silt loam (38, 54, 8 – % sand, silt, clay) slope = 2.3%	Abu-Zreig et al., 2003
8	15	80	grass	silt loam (38, 54, 8 – % sand, silt, clay) slope = 2.3%	Abu-Zreig et al., 2003
9	16	95	--	--	Vought et al., 1994
10	20	67	grass	Illinois, high-flow wetland	Mander et al., 1997
5	26	78	grass	Slope = 2%	Schwer & Clausen, 1989
6	27.4	88	grass/sorghum	Slope = 4%	Young et al. 1980
10	28	81	grass	Illinois, high-flow wetland	Mander et al., 1997
12	36	61	grass	--	Thompson et al. 1978
11	60	84	grass	Slope = 2%	Edwards et al., 1983

Particulates (TSS) are the easiest to remove, and as depicted in Figure 3, a 100-foot buffer will remove nearly 100% of the sediment load passing through it. Referring to Figures 1 and 2 above, an increase in buffer width from 50 feet to 100 feet results in a 10-12 percentage point increase in TP and TN removal efficiencies within the buffer – a significant improvement in buffer performance that may be worth consideration even though such an increase results in doubling the land consumed by the buffer. Further increases in buffer width beyond 100 feet appear to result in little additional improvement in the buffer's overall pollutant removal efficiency.

The minimum buffer width established by Montgomery County on Use I streams such as Ten Mile Creek is 100 feet, and as illustrated above, this minimum buffer width is quite effective in filtering pollutants. However, it is recommended that this minimum buffer be expanded beyond 100 feet to encompass adjacent steep slopes ($\geq$ 25%), the 100-year floodplain, and non-tidal wetlands and associated 25-foot wetland buffer. In addition, it is recommended that priority be given to providing any required afforestation/reforestation under the Forest Conservation Act (FCA) to those areas adjacent to the stream buffer, resulting in a larger contiguous forested riparian buffer.

Table 3: Summary of TN Removal Efficiency Data, References, and Vegetative Type

data label in figure 2	buffer width (m)	removal efficiency	vegetative cover type	comments	reference
1	1.5	57	grass	gravely silt loam slopes = 10%	Doyle et al., 1977
2	3	28	grass	Coland soil, average slope = 3%	Lee et al., 2004
3	4.6	50	grass	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	4.6	17	shrub	gravely, silt-loam soils, slopes = 35%-40%	Magette et al., 1987
2	6	46	grass	Coland soil, average slope = 3%	Lee et al., 2004
3	9.1	67	grass/rye mix	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	9.2	51	grass	gravely, silt-loam soils, slopes = 35%-40%	Magette et al., 1987
5	26	76	grass/rye mix	Slope = 2%	Schwer & Clausen, 1989
6	27.4	87	grass/sorghum	Slope = 4%	Young et al., 1980
9	36	69	grass	--	Thompson et al., 1978
10	60	83	grass	Slope = 2%	Edwards el al., 1983
7	79	99	grass	Raleigh, NC	Barker & Young, 1984

Table 4: Summary of TSS Removal Efficiency Data, References, and Vegetative Type

data label in figure 3	buffer width (m)	removal efficiency	vegetative cover type	comments	reference
3	4.6	63	grass	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	4.6	72	shrub/grass	gravely, silt-loam soils, slopes = 35-40%	Magette et al., 1987
11	5	91	grass	Topsoil with high clay content slopes = 5.0-7.2%	Gharabaghi et al., 2000
3	9.1	78	grass	Virginia, well drained flat agriculture	Dillaha et al., 1989
4	9.2	86	shrub/grass	gravely, silt-loam soils, slopes = 35-40%	Magette et al., 1987
11	10	96	grass	Topsoil with high clay content slopes = 5.1-7.2%	Gharabaghi et al., 2000
11	15	95	grass	Topsoil with high clay content slopes = 5.1-7.2%	Gharabaghi et al., 2000
11	20	95	grass	Topsoil with high clay content slopes = 5.1-7.2%	Gharabaghi et al., 2000
5	26	89	grass	Slope = 2%	Schwer & Clausen, 1989

Volume Control SWM Practices

Volume control SWM practices are those that reduce not only the peak discharge, but also the volume of runoff. Due to the added difficulty and expense of measuring the inflow and outflow hydrographs, only limited volume monitoring of typical BMPs has been conducted over the years, but based on the available data it is apparent that some BMPs perform much better in this respect than others. For example, "wet" facilities – those that retain a permanent pool of water – appear to provide little or no reduction in runoff volume, while "dry" facilities, such as dry detention ponds, have been found to provide at least some runoff reduction.

The importance of volume control BMPs, particularly when applied to sensitive streams like Ten Mile Creek, is the ability of such practices to better address the critical issue of stream channel erosion compared to those BMPs that provide only peak management. In addition, practices that reduce the volume of runoff will directly reduce the annual pollutant "load" and therefore have greater benefits downstream in Lake Seneca and the Chesapeake Bay.

It is worth noting that with the exception of "submerged gravel wetlands" – an oddity that is only likely to be used on Maryland's Eastern Shore – all of the ESD techniques recently adopted by MDE provide volume control through infiltration and/or evapo-transpiration (ET). The ESD "planning techniques," which reduce the impervious footprint, as well as non-structural practices or "disconnects," are obvious examples of ESD techniques that result in reducing runoff at or near the source. However, some structural or "micro-scale" practices also reduce the runoff volume. For example, Penn State found a 60% reduction in annual runoff volume associated with a green roof compared to a conventional roof. And limited monitoring of bio-retention found a 40% reduction in event runoff volume associated with this BMP.

An expansive discussion of the latest SWM regulations in Maryland is beyond the scope of this short paper. However, it is apparent that the new ESD regulations recently adopted by MDE will be applied to any future development in the Ten Mile Creek watershed. Therefore, volume control will be provided and this important issue should be adequately addressed via the new SWM regulations.

Maintenance of Stream Baseflow

Although the establishment of adequate riparian buffers will contribute to the maintenance of baseflows, additional recharge opportunities can often be found in the upland areas of a watershed. While closely related to the "volume" issue discussed above, it is worth noting that not all volume control BMPs provide groundwater recharge. For example, the 60% reduction in annual runoff volume reported for a green roof is the result of ET alone, not infiltration. While we believe that green roofs can play a valuable role, it is apparent that other ESD measures that provide opportunities for infiltration and recharge, such as "disconnects" and all but one of the "micro-scale" practices, will be critically important to the maintenance of baseflows. Although maintenance of baseflow is not particularly difficult to achieve, and it seems likely that the new ESD regulations will be adequate, the importance of this issue cannot be underestimated if we are to protect sensitive streams like Ten Mile Creek.

Effective Erosion and Sediment Controls

The USEPA has recently adopted final rules establishing effluent limitation guidelines (ELGs) for construction. In addition, MDE will soon adopt new and more stringent ESC regulations and a new ESC design manual. It is apparent that these new and more stringent regulations will apply to planned future development in the Ten Mile Creek watershed and will improve the sediment control program in Maryland and provide significant additional protections to Ten Mile Creek.

As documented in the Attachment, the history of ESC and SWM regulations in Maryland and in Montgomery County has consistently resulted in more stringent (and more effective) ESC and SWM controls. It is important to keep this trend in mind when reviewing scientific papers and experience on previous developments. The new ESC and SWM requirements in MD will clearly improve performance and provide better protections to Ten Mile Creek than the older and less effective standards applied in previously developed phases of the Clarksburg SPA.

Montgomery County has decades of experience with this issue and a lengthy discussion of the importance of effective ESC is both unnecessary and beyond the scope of this report. However, one example of an operational technique is offered: storms in series. If a sediment basin is still holding a significant volume of runoff from a previous storm and more wet weather is forecast, it is suggested that consideration be given to pumping (i.e., dewatering) the basin through a filter bag and then to the stream buffer for final polish so as to increase the basin's holding capacity and improve its ability to effectively treat the sediment laden runoff from a subsequent storm. If adequate time is available between storms then this operation should not be necessary, but when storms are separated by only a few hours this approach can improve basin performance and result in reduced sediment loads to the receiving stream.

Stream Crossings and Other Encroachments

While obvious, it is worth noting that any encroachments in the stream valley and riparian buffer that can be avoided should be avoided. However, this is not always possible. If an encroachment such as a roadway and culvert are necessary, the design should include provisions for fish passage. Migrating fish cannot swim through rock riprap. The design of the culvert and the placement of the riprap should allow the young of the year to retreat into headwater areas where they can seek refuge from the adults – yes, trout will eat their young if they can catch them. And inlet and outlet channels should be immediately planted with willows or other appropriate vegetation that will rapidly provide shade to the exposed channel and thus mitigate thermal impacts. Further discussion of such mitigation measures is beyond the scope of this short paper, but the above example offers some ideas on how such mitigation can be effective when it is focused on the needs of the stream. And finally, adequate sediment controls, particularly in such close proximity to the stream, is another obvious concern that must be addressed in the design and vigorously enforced during construction.

Case Study: Red Run, Owings Mills, Maryland

Background

Owings Mills was designated a "growth area" on the Baltimore County Master Plan in 1980. Significant public investment was made by state and local governments for highways, arterial roads, and water and sewer services. While significantly larger than the Clarksburg SPA, the Owings Mills Growth Area does have some distinct similarities, including ready access to an interstate highway (I-795) and mass transit (light rail). Significant construction commenced in 1984 and was largely completed by 2000. Red Run is designated Use III (natural trout) waters and its roughly 7.5 square mile watershed encompasses much of the Owings Mills Growth Area. Development within the Red Run watershed consists mostly of high-density residential (townhouses, condos and apartments), plus Owings Mills Mall, a neighborhood shopping center, and office space. Finally, it is important to note that the development that occurred within the Owings Mills Growth Area, like all development prior to 2002, was governed by SWM regulations that are now two generations behind the times.

Strategies Used to Protect Red Run

Many of the recommendations discussed in the previous sections of this report were applied to development in the Red Run watershed, including:

- Substantial forested riparian buffers having a minimum width of 100 feet and expanded beyond this minimum to encompass adjacent steep slopes, the floodplain, wetlands and wetland buffers.
- Forest conservation areas located adjacent to the riparian buffer to create larger contiguous forested areas in close proximity to stream channels.
- Dry extended detention ponds that were planted and then allowed to "naturalize" with trees and shrubs, providing shade and encouraging infiltration and ET. The use of these dry ponds also avoided the thermal impacts often associated with wet ponds.
- Stringent criteria for all stream crossings requiring that these encroachments accommodate fish passage and requiring immediate planting of inlet and outlet channels to provide critical shade for the exposed stream.

The above is a list of the major design elements. For additional information on matters such as ESC compliance efforts, please contact Baltimore County DEPRM. However, it is worth noting that impervious area caps were not used in the Red Run watershed.

Lessons Learned

A study conducted by DNR in 2000 found that Red Run continues to support both brook trout and brown trout populations. Thus, it is apparent that the measures employed – avoidance of thermal impacts, fish passage, SWM measures that encourage infiltration and ET, and an effective forested riparian buffer – have all worked well.

In a recent article reporting on perceived faults in the EPA's Chesapeake Bay TMDL model, the Chesapeake Bay Foundation is quoted as stating that the EPA's numerical model has been revised in the past and will probably be revised again in the future, but that ultimately the Bay will tell us when it is healthy. We agree. And based on the assessment conducted by DNR, the Red Run is telling us that it is healthy.

The strategies suggested above to protect Ten Mile Creek are not simply untried text book theories, but are practical solutions that have proven to be successful.

Impervious Area Caps – Fact and Fiction

The issue of impervious caps is sometimes referred to in the literature as Total Impervious Area (TIA), or as "watershed imperviousness." Perhaps the sole advantage of this approach is its simplicity and ease of use by planners. But its simplicity is also its greatest flaw. Such approaches attempt to apply a simplistic solution to what is clearly a complex problem, or as one paper on TIA states, "We all yearn for simplistic, easy answers, but we are dealing with very complex ecosystem processes…" (Clar, 2000). The imposition of impervious caps can also conflict with smart growth initiatives by mandating only large-lot, single-family residential development and thereby placing greater pressures on outlying parcels, thus encouraging sprawl.

There are numerous examples of streams with good habitat quality that drain watersheds with TIA greater than 10 percent. For example, within a group of 45 watersheds with TIA greater than 25 percent, 9 were ranked as good habitat quality, 13 were ranked as fair, and 16 were ranked as poor. Obviously, factors other than TIA are affecting the ranking of these watersheds (Clar, 2000). And in a more recent paper on the subject (Schueler, et al., 2009), the authors state that the effects of "watershed treatment" (i.e., buffers, SWM practices, etc.) has seldom been measured and is often incomplete. In other words, few studies have even attempted to correlate TIA with other important watershed factors such as buffers and SWM measures, and those few that have were found to be lacking.

It is apparent from a review of the literature that TIA is at best a poor indicator of stream health. The imposition of impervious caps based on this crude and unreliable parameter is equivalent to knowing the precise weight of a freight train, and then based solely on this number, trying to determine what the train is carrying – the weight of the entire train is too broad a parameter and of no practical value since it tells us nothing about what we would really like to know, such as what's inside a particular box car.

The subject of "micro-caps" has also been raised, and therefore, a brief discussion of this issue is provided here. Essentially, "micro-caps" impose impervious caps on individual parcels rather than at the watershed scale. The benefits of clustering have clearly been demonstrated at the site level. When we establish higher density zones in close proximity to existing transportation, utilities and other infrastructure, and establish limited development zones and/or agricultural preservation zones in the more remote portions of the watershed, we are applying the demonstrated benefits of clustering at the watershed scale rather than the site scale. The imposition of "micro-caps" is not recommended. The health of the receiving stream will ultimately be dictated by what occurs within its <u>watershed</u>, not what occurs on a single parcel.

Conclusions

In summary, the following measures are recommended for implementation in the Ten Mile Creek watershed:

- Preserve or establish effective forested riparian buffers.
- The application of "volume control" stormwater management practices that don't simply filter runoff and reduce peak discharges, but also reduce the volume of runoff through infiltration and/or evapo-transpiration (ET).
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ATTACHMENTS

Stormwater Management Comparison

	Existing Clarksburg Development Under Construction	New Regulations- Environmental Site Design* (ESD)
CPV (Quantity Control)	Dry Ponds	Typically- Quality controls will be met in the numerous upland facilities. Ponds will not be favored, vegetated or gravel wetlands can be used in some cases
Surface Sand Filters	Contributing D.A. Drainage Area 3-8 acres (typ)	Smaller subareas, ESD practices will be used instead of sand filter
Underground Water Quality Structures	Contributing D.A. 1-4 acres (typ)	Not favored but when used, D.A. 0.5 acre ± typ. No recharge benefit
***Biofilters**	Contributing D.A. 1-2 acres (typ)	Contributing D.A. 0.4 acre typ. (pollutant removal, recharge and flow dispersion benefits)
***Water Quality Swales**	Used Sparingly	Favored practice (pollutant removal, recharge, flow attenuation benefits)
***Recharge Trenches**	Under sand filters and in lots/parcels	Scattered throughout site (recharge benefits provided in more locations)
***Raingardens**	Seldom Used	Encouraged in lots/parcels for small D.A.'s (pollutant removal, recharge and flow dispersion benefits)
***Porous Pavement**	Seldom Used	Encouraged practice- typically in private parking areas, driveways and sidewalks (pollutant removal, recharge and flow dispersion benefits)
***Stormwater Management or Vegetated Practices in Public R/W Now Required by New Road Code**	Not Typically Allowed, except for standard open section flow	Minimum of 25% of the SWM requirement of closed section roadways met with vegetated practices at or near source Minimum of 60% of the SWM requirement of open section roadway met with vegetated practices at source

*Environmental Site Design- Small Subareas to each water quality feature

- Grade sites to minimize cut and fill and replicate existing topographic and drainage patterns to the maximum extent possible
- Treat runoff at or near the source
- Replicate natural hydrology to the maximum extent possible
- Minimize concentration of flow, disperse flow with small subareas and non-erosive outfall conditions
- Encourage recharge throughout site in numerous locations
- Locate features such as microbiofilters, raingardens, water quality swales, porous paving, etc. at the source of the runoff (at parking areas, adjacent to roadway areas, in lots, in parcels)
- See Chapter 5 of MDE guidelines for a more comprehensive summary

Sediment Control Comparison

Existing Clarksburg Development Under Construction	New Regulations
1. Large permitted areas allow for mass grading of large areas with limited or no phasing restrictions	1. Will require limitation on the amount of area that can be disturbed at one time. (probably 20 acres) with agency regulated phasing restrictions
2. Due to Item 1, as development progresses, both the disturbed areas and the newly developed areas continue to drain to the sediment traps and basins for an extended period, often several years. The permits are difficult to close out due to their size and the number of facilities to be converted	2. As a result of item 1, the limited area of disturbance will be in the sediment phase for relatively short time period and as this development progresses, the permanent SWM facilities will be constructed and brought online on a timely basis
3. Due to items 1 and 2, the time period for potential sediment loading is extended and the benefits that come with converting to permanent stabilization with SWM facilities online are deferred causing for adverse impacts to the receiving streams	3. As a result of items 1 and 2 the time period for potential sediment loading will be minimized and the benefits associated with converting to permanent stabilization with SWM facilities online will be realized more quickly
4. Previous NOI monitoring requirements applied	4. New NOI monitoring requirements apply, a more detailed analysis is required at time of application, more attention to regular monitoring during construction and corrective action if conditions warrant

Forest Conservation and Stream Buffer Comparison

Existing Clarksburg Development Under Construction (Use IV)	New Development 10 Mile Creek (Use I)
1. Forest Conservation Plans initially reviewed under the 1992 requirements; in some cases the 2001 requirements applied	1. The Forest Conservation regulations were updated in 2001 and included new provisions including a new definition for the minimize size of an existing forest, a minimum threshold for forest retention for projects reviewed under the optional Method of Development and a higher level of attention to protecting quality forest stands outside of the stream buffer areas
2. Base stream buffer requirement dependent on steam valley slopes	2. Base stream buffer requirement dependent on steam valley slopes
3. 175 buffer recommended in Master Plan- was not typically applied to existing developments	3. 175 buffer recommended in Master Plan- will apply to Pulte property
4. No additional buffers required	4. Private conservation easement on Pulte property will expand the buffer to protect erodible soils, steep slopes, priority forest cover, create expanded buffers from wetlands and streams, promote natural recharge, expand corridor for wildlife and create opportunities for additional afforestation
5. Specimen trees preserved when practical in conjunction with plans review	5. New process- A variance application must be submitted to MNCP&PC/MCDEP requesting permission to remove any specimen tree, with a justification letter (required at time of Preliminary Forest Conservation Plan review).

New Federal Requirements for the
General Permit for Stormwater Associated with Construction Activity
(as of January 1, 2009)

Projects that disturb one or more acres of earth must apply for either a General or Individual Permit for Stormwater Associated with Construction Activity. Projects that will disturb 150 acres or more and which discharge to a water listed as impaired on Maryland's 303(d) list must apply for an individual permit. All other projects may apply for a general permit. The Maryland Department of the Environment (MDE) may later determine that an individual permit is required for some projects.

MDE will enter the application form and related data into a database on MDE's website. The posting of the project in the database starts a minimum 45-day public participation period for sites with 3 acres or more of disturbed area or a 30-day period for sites with 1 to 3 acres of disturbed area. During this time, citizens may ask to review the available erosion and sediment control and stormwater management plans at the approval authorities for those plans.

Existing general or individual permittees who seek to increase the disturbed acreage covered by their permit must also submit an application form. Permittees with existing, unexpired coverage under any previous General Permit for Stormwater Associated with Construction Activity are now covered by General Permit 09 GP. Additional phases or portions of a project not covered under a previous general permit must comply with the conditions of the new general permit.

Documentation Requirements for NOI Applications

Erosion and Sediment Control (ESC) and Stormwater Management (SWM) Plans required under the new general permit (with the exception of those plans for sites covered under a previous version of the general permit) must include written documentation demonstrating that the plans addresse nine points relating to the incorporation of Environmental Site Design (ESD), limiting disturbance to highly erosive soils, steep slopes, and infiltration/recharge areas, the minimization of clearing and grading, and TMDL compliance.

Consistency with Total Maximum Daily Loads

If the discharge covered by the permit enters a water with an established or approved Total Maximum Daily Load (TMDL), the permittee must implement measures to ensure that the discharge of pollutants from the site is consistent with the assumptions and meets the requirements of the approved TMDL, including any specific waste load allocation that has been established that would apply to the discharge.

Responsibilities in Cases of Sediment Release (Triggering Event)

If the permittee observes any of the triggering events described in the regulations, or if the enforcement authority or MDE informs the permittee that a triggering event has occurred, the permittee must undertake the following actions.

1st Triggering Event

Within one day the permittee must inspect the ESC practices to verify compliance with the approved Plans. If the practices are found to be in compliance with its approved plans, the permittee shall, by the next business day, inform the authorities about the conditions observed during the inspection. Any subsequent additional measures required by the enforcement authority to prevent future triggering events must be implemented within four days

2nd Triggering Event

Within 3 days of the occurrence of a second triggering event, the permittee must contact the plan enforcement and approval authorities and advise them that a second event occurred and that the permittee will review the approved plans in conjunction with the approval authority. The permittee must submit revised plans to the approval authority no later than 14 days after the second triggering event. The permittee must begin implementation of the changes immediately upon approval.

New NOI Monitoring/Record Keeping Requirements

During construction the permittee must maintain at the site, the approved erosion and sediment control plan, the approved stormwater management plan, a copy of the General Permit, a copy of the NOI application and a copy of the NOI approval form. A logbook must also be maintained onsite that contains written reports of all inspections conducted by the permittee, inspection reports and enforcement actions issued to the permittee by enforcement authorities, and any pertinent data related to the NOI.

During the entire period of permit coverage, for all active and inactive sites, inspections of the permitted area must be conducted weekly, the next day after a rainfall event resulting in runoff, and after a triggering event